

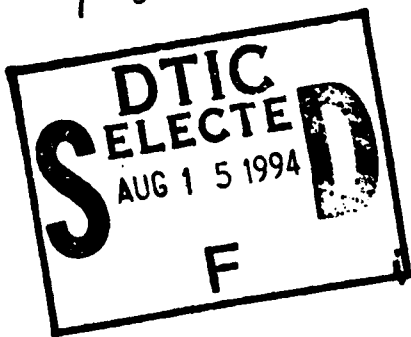

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AIR WAR COLLEGE

AIR UNIVERSITY

THE VALUE OF SPACE CONTROL AND HOW WE CAN ACHIEVE IT

by

Brian E. Carron
Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

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APRIL 1993

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AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: The Value Of Space Control and How We Can Achieve It

AUTHOR: Brian E. Carron, Lieutenant Colonel, USAF

This report provides a discussion on the value of space control and whether or not we can achieve it. Space control encompasses offensive and defensive concepts that include surveillance and warning, survivability, launch and negation. In short, space control means more than negation or anti-satellite capabilities. The surveillance, survivability and launch legs of the definition are fairly robust and will not be dealt with to any degree of detail in this paper. However, the negation aspect is the only leg of this space control definition that has not achieved fruition. Additionally, it has been the subject of great debate since the early 1970's. In a rapidly changing world, the debate over the need for an anti-satellite capability is sure to be a debate worth observing and participating in.

In anticipation of and in an effort to foster this debate, this paper will address the following with respect to achieving total space control: a definition of the term space control, a summary of the latest national security strategy guidance, and a description of the threat posed to the U.S. national security by the Commonwealth of Independent States (CIS) and the rest of the world. Given these stage

setting topics, a case for space control and why space systems are important will be constructed. This will be followed by a description of potential anti-satellite threats to U.S. satellites, and key points that argue for a more robust mix of active and passive anti-satellite alternatives to a kinetic or directed energy weapon system. Finally, a perspective on how space control can be achieved will be offered.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Brian E. Carron, received a BS degree in Political Science from Drake University, and an MA degree in Purchasing and Materials Management from Webster University. His professional military education includes Squadron Officer School by correspondence and in residence, Air Command and Staff College by correspondence, and Air War College by correspondence and in residence.

He began his active duty as a Deputy Missile Combat Crew Commander and later upgraded to the position of Crew Commander in Titan II missile operations. He transitioned to the space operations career field where he served as a space surveillance officer and later as a Senior Director in the Space Defense Center in the NORAD/ADCOM Cheyenne Mountain Complex. He has also served as the NORAD/ADCOM liaison to HQ Alaskan Air Command. After spending a year at the 13th Missile Warning Squadron, Clear Alaska as a Space Systems Director and as the Chief of Training, he was assigned to HQ Space Division and the Space Defense System Program Office as the Chief, Space Defense Command and Control System Integration Branch. In that position, he initiated and managed development of anti-satellite test procedures and modifications to a key space surveillance radar used in support of F-15 Air Launched Anti-Satellite (ALASAT) test program. He has also

performed staff officer duties at HQ Air Training Command where he was responsible for all officer and enlisted space training. In this position, he was deeply involved in the development and implementation of the Undergraduate Space Training Program. He was then assigned to the Office of the Secretary of the Air Force in Washington D.C. where he worked in the Office of Research as Chief, Advanced Systems. He has also served on the staff of the Air Force Space Command, Deputy Chief of Staff for Operations as Chief of the Space Activities Division and was responsible for the operational development, test, and deployment of the Passive Space Surveillance System.

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PREFACE

In 1988, the Air Force articulated its first Space Policy.

Specifically, this policy stated that, "Space power will be as decisive in future combat as Airpower is today." And, that, "We must be prepared for the evolution of space power from combat support to the full spectrum of military capabilities."⁽¹⁾ Since these pronouncements, the medium of space and space systems have assumed an increasingly important role in the execution of U.S. national security policies and practices.⁽²⁾

Up to the start of Desert Shield, space and space systems had been the silent partner of the Services. This all changed during Operation Desert Shield/Storm. Space system capabilities were successfully demonstrated as they came forward and asserted themselves for the safety of the U.S., its services and its allies. Based on the performance of these systems during that war, they have become even more important as the U.S. monitors and responds to the changing geopolitical world order.

The growing importance of space as a major contributor to any future conflict or crisis, was captured by General McPeak, Air Force Chief Of Staff on 19 June 1992. In a historic pronouncement, General McPeak stated that the new Air Force Mission is, "To defend the United States through the control and exploitation of air and space."⁽¹⁴⁾

But, the true capability of the U.S. to control and exploit space will be debated for a long time. In an era of a rapidly changing world order, economic and political turmoil, the proliferation of weapons of mass destruction, missiles and space systems, a declining Department of Defense (DoD) budget and restrictive international treaties, the U.S. may not be able to completely achieve the control and exploitation of space.

In order to get to the heart of this question and others concerning the value of space control and whether or not we can achieve it, this report will first put the topic in context by providing the following: a definition of the term space control, a summary of the latest national security strategy guidance, and a description of the threat posed to the U.S. national security by the Commonwealth of Independent States (CIS) and the rest of the world. Given these stage setting topics, a case for space control and why space systems are important will be constructed. This will be followed by a description of potential anti-satellite (ASAT) threats to U.S. satellites, and key points that argue for a more robust mix of active and passive alternatives to a Kinetic or Directed Energy Weapon system. Finally, the author offers a perspective on how space control can be achieved.

CHAPTER I

INTRODUCTION

In 1988, the Air Force Space Policy statement contained several key tenets about Space. Two of these tenets held that, "Space power will be as decisive in future combat as airpower is today." And, that, "We must be prepared for the evolution of space power from combat support to the full spectrum of military capabilities."⁽¹⁾ These tenets were very prescient because since then, the medium of space and space systems has assumed an increasingly important role in the execution of U.S. national security policies and practices.⁽²⁾ For example, in early 1991, Operation Desert Storm demonstrated that, even with a diminished Soviet presence, threats to global security will continue to exist. Desert Storm also demonstrated that the utilization of space systems will be crucial to the ability of the U.S. to not only provide for the national defense but influence world events as well.⁽²⁾ Two years later, after the United States and its allies extensively used space systems in their successful effort to expel Iraqi troops from Kuwait, U.S. military commanders are more cognizant about the value of military satellites to the successful prosecution of the battle.⁽³⁾ In the future, the U.S. reliance on space systems will become even more critical as it monitors and develops new national security policies and practices with respect to the rapidly changing geopolitical world order. In fact, this author envisions that the utility of these systems will be increasingly important in tracking the activities of the world's major weapons exporters, and in ensuring that the medium of space is used for peaceful purposes only. In particular, U.S. efforts will be especially important as the World's weapons exporters proliferate

chemical, biological and nuclear weapons, critical technologies, launch capabilities and satellites to Third World countries.

In reality though, the capability of the U.S. to develop and maintain efficient and effective systems designed to track the efforts of weapons exporters, let alone ensuring the control and the peaceful use of space, will be debated at great length. A debate that undoubtedly will be lengthy due to the rapidly changing and uncertain world order, and the rapidity of budget cuts spawned by the Department of Defense (DoD) build-down of forces and capabilities. These budget reductions may mean that the level of support, provided by space systems in future conflicts, may not be available when they are really required. The sad truth is, that without the requisite funding, developmental efforts, Congressional support and the abrogation/modification of certain legal barriers, our space systems may be at risk from our future adversaries. In fact, some would even argue that our space systems are already at risk. They are at risk because, our future adversaries have seen what space systems can do, and that space is fundamental to modern warfare and national security.(4) Based on that performance, adversaries will find it imperative that they be able to deny the U.S. the unrestricted use of space it enjoyed during Desert Storm.

But wait a minute! Is the above perspective much too melodramatic? Are there really threats out there that we should be concerned about? Are these space systems really at risk given the uncertain and unknown threat environment that possibly awaits the U.S. in the next several years? Can the U.S. afford the costs associated with developing an effective space control system? Are space systems really efficient and effective? Did our space systems really prove

that they were critical to U.S. and allied success during the preparation for and execution of Desert Storm?

The purpose of this paper will be to answer these questions, and show that controlling the medium of space has value and that it must be achieved if the U.S. is to maintain its role and status as the sole remaining world superpower. But in anticipation of the debate over the value of space control and whether or not it can be achieved in a period of severe budgetary constraints, this paper will first put the topic in context by providing the following: a definition of the term space control, a summary of the latest national security strategy guidance, and a description of the threat posed to the U.S. national security by the Commonwealth of Independent States (CIS), formerly the Soviet Union, and the rest of the world. Given these stage setting topics, a case for space control and why space systems are important will be constructed. This will be followed by a description of potential anti-satellite (ASAT) threats to U.S. satellites, and key points that argue for a more robust mix of active and passive alternatives to kinetic or directed energy anti-satellite weapon systems. Finally, a perspective on how space control can be achieved will be offered.

CHAPTER II

SPACE CONTROL DEFINED

Before proceeding, it is critically important for the reader to understand what is meant by the term space control. According to the new Air Force Doctrine, contained in AFM 1-1, space control has become part of the new lexicon known as aerospace control. The purpose of aerospace control is to assure the friendly use of the environment while denying its use to an enemy.(5) This is somewhat analogous to

Naval Doctrine that dictates that naval forces attempt to control movement at sea to prevent an opponent from using the ocean as an avenue for attack against friendly forces and to ensure the transport of friendly material.(6) In much the same way, aerospace forces attempt to control the aerospace environment to deny its use to the enemy and to assure friendly use of the environment without unacceptable interference.(6) In short, it embodies the idea of space superiority over the battlefield.(7)

Aerospace control includes air and space missions. A typical mission of aerospace control is called counterspace that has as an objective, the control of space. This counterspace is further divided into offensive and defensive aerospace control. Offensive aerospace control operations are conducted to seek out and neutralize or destroy enemy aerospace forces and ground-based defenses at a time and place of choosing. Defensive aerospace control operations are conducted to detect, identify, intercept and destroy enemy aerospace forces attempting to attack friendly forces or to penetrate the aerospace environment above friendly surface forces.(5) Aerospace control includes all missions designed to gain and maintain control of the aerospace environment.

What do these definitions really mean? In laymans terms, they mean that space control consists of four areas: surveillance, survivability, launch and negation activities. In an effort to narrow the focus of this paper, the only area that will be addressed is the negation aspects of space control. Or, more simply put, the need for an ASAT capability and the ability to use and deny the enemy the use of earth orbit as a terrestrial force multiplier during wartime.(8) Therefore, with this definition of space control, how does it mesh

with the recently released U.S. National Security Strategy (NSS)?

CHAPTER III

SPACE CONTROL AND THE NATIONAL SECURITY STRATEGY GUIDANCE (NSS)

As a point of departure for this section, a short summary of the NSS is required. The purpose of the NSS is to set the strategic course and direction for the country. As a biennial product of the executive branch, it serves as the foundation for the development of all strategic goals and objectives. As a foundation, it fosters a building block approach for the development of other strategies to include U.S. military strategy. For example, the military strategic goals and objectives are found in another document entitled the National Military Security Document (NMSD). This integrated strategic guidance is then used to aid in the development of other policies like the National Space Policy, defense planning guidance and scenarios, and detailed budget submissions.(9)

Aside from a brief tutorial about the NSS and the NMSD, what is the relevance of the above information to this paper? From the standpoint of space control, the 1993 NSS has been significantly altered from that which was published two years ago. The latest NSS reflects that the world has changed and the overall threat to the United States has diminished. But more specifically, the top level focus this country will now place on space control activities has been eliminated. From this authors' perspective, this fact seems very counterintuitive given the importance this country has historically placed on space and space systems, and the demonstrated contributions provided during the Gulf War.(2) However, for clarity and fairness, it must be noted that this new NSS broadly advocates the continued use of space for tactical and strategic applications and increased

attention on multinational space efforts.(10) Despite the breadth of this wording, the 1993 document lacks the direct and specific guidance that was contained in the 1991 document. Specifically, that document stated that, "We must also have the option of active defense systems, including an anti-satellite system, to stop an aggressor before he can use a space system to threaten objects or people in or from space."(11) This previous guidance at least established a foundation to ensure U.S. space systems would be protected from a growing list of potential adversaries. To determine the intent of the new NS wording, a member of the Bush Administration was contacted. Dr. L.V. (Joe) Scifers, a former member of the National Space Council, stated that the authors of the new NSS eliminated the previous specific guidance because, "in today's changing environment, anti-satellite systems are a low priority."(12) Additionally, "the State Department and Congress do not like anti-satellites."(12)

But, despite this NSS guidance, the author of this paper contends that an ASAT system is required in the future to protect U.S. space systems. This view is not based on idle meandering or warmongering hysteria designed to continue the heated proliferation of arms in a world of uncertain calm. Nor is this view an effort to invent a rogue threat du jour. On the contrary, this view is based on the need to be prepared to deal effectively with unknown and as yet undefined future threats. Most assuredly, some will argue that there is no threat, and that the new world order eliminated the need for ASAT weapons. A point that is supported by a report attached to the 1992 House version of the National Defense Authorization Act. The report stated that severe budget constraints, coupled with the fall of the Soviet Union, made ASAT efforts unnecessary.(13) However, as will be shown later in

this paper, this position is contrary to the January 1993 version of the U.S. National Space Policy. So, thanks to Congressional action, the U.S. ability to prevent hostile use of space will remain nonexistent.(14) It will remain nonexistent despite Department of Defense (DoD) plans to spend \$20 million on ASAT efforts in 1993. While \$20 million is nothing to quibble about, it is woefully inadequate to keep a meaningful program (i.e. responsive to the threat) alive and deliberately progressing toward a major acquisition milestone decision. Unfortunately, this funding probably only provides for completion of previously funded contractual work. What is missing is the long term plan for building an ASAT system that advocates had pushed so hard for in recent years.(13)

Therefore, a return to a far more comprehensive NSS, from a space control perspective especially in this uncertain world environment would be far more prudent. The rationale for this position will be illustrated in the following sections of this paper.

CHAPTER IV

THE THREAT

Strategists everywhere would agree that the world and the U.S. has entered a new era. An era where the major threat, as we knew it for many years, has disappeared allowing the world to transition to an unfamiliar and peaceful co-existence. In this new environment, some strategists would even argue that there is little reason to sell or procure weapons. In particular, some would also argue that there is absolutely no reason at all to develop or sell weapons or systems that could be used to control the medium of space. But, is the world ready to put away their arms and accept peaceful co-existence? In an effort to determine the validity of this question, a brief look at the

threat, past and future, is required.

The Cold War World Environment

For nearly forty five years, the world had a bipolar (U.S. and Soviet Union) focus and a bilateral problem solving approach.(15) Before, the fall of the Berlin Wall, there was a degree of political and world stability. This stability was caused by the fundamental competition and conflict between the ideologies of the United States and the Soviet Union. This competition of beliefs more or less kept the rest of the world in check. In this bipolar world, the Soviet Union possessed massive amounts of nuclear and conventional weapons and personnel, the capability to inflict great damage to the U.S. homeland, the hostile intent toward the U.S. and a more or less certain direction. Additionally, the Soviet Union possessed an aggressive and expanding space program. This aggressiveness allowed them to do several things. For instance, they conducted up to 2,181 successful satellite launches over a period of 32 years, as compared to 908 launches over the the same timeframe for the U.S., and they also developed an operational ASAT system.(16)

During the forty five year span of the Cold War, the Third World countries really did not pose a threat to either the U.S. or the Soviet Union. Initially, they possessed few weapons of any kind or the means/will to produce them. Instead, they were rather quite adept at begging from the superpowers in order to obtain sophisticated arms and copious amounts of aid.(17) The more that these Third World countries played on this competition, the more weapons they were likely to obtain for their loyalty to one side or the other. From a space systems perspective, the Third World had barely gotten started in terms of using satellites, launching satellites or developing any

infrastructure with which to control and communicate with any of the satellite(s) they may have used or owned. Instead, a great deal of reliance was placed on the U.S. and the Soviet Union to provide the requisite infrastructure support.

The Post-Cold War World Environment

The new paradigm of the Post-Cold War has a multilateral focus with significant political and economic emphasis.(15) The Soviet Union has been transformed into the Commonwealth of Independent States (CIS), and the Warsaw Pact has been dissolved. The direct result of these actions is that the imminent threat of global nuclear war has been significantly decreased. But, prudence demands a cautious euphoria because the CIS still possesses approximately 27,000 tactical and strategic nuclear warheads with the delivery systems that go with them.(18) While they have agreed to begin reducing this number, their ultimate intentions with regard to the use of these systems are about as obscure as they were before the end of the Cold War. In short, despite their stated intent, they still remain very capable of wreaking havoc on the U.S. homeland. Additionally, the CIS still possesses one of the largest conventional forces in the world. A force that quietly poses a potential threat to U.S. and Europe.(19) On the basis of its size and population alone, the CIS is still a very powerful nation-state. But, the prognosis for the CIS in the Post-Cold War decade is likely to be one characterized by continued economic dislocation, turmoil, and regional/political instability.(20) All sectors of the economy will continue to be faced with extreme competition for scarce resources. A competition that would seem to argue against any large scale investment in military equipment and technology.(19) A wholesale failure to resolve these problems could

see parts of the CIS return to their cold war-like ways.(21) In fact, because of these problems, the world may see Russia return to their old ways sooner than anticipated as the old politicians and military hard-liners maneuver for power.(21)

Given this new paradigm as a backdrop, it would seem that the level of investment once enjoyed by the CIS in their space program, can no longer be realistically sustained by a faltering economy lest they risk a tremendous backlash from the masses.(19) While Russian space spending is on the decline, it still represents a sizeable portion of their overall budget. The Russians during 1992 launched 50% more space missions than the U.S. In fact, the former USSR launched more space missions in 1992 than the combined 1992 total for all the other nations of the world.(22) Recent information indicates that the Russian military space forces are launching new missile warning, photo-reconnaissance and electronic intelligence spacecraft to bring Russian capabilities in key military areas to about the same operational levels maintained prior to the collapse of the former Soviet Union.(22) Given the level and nature of these activities, their ultimate direction and intentions are truly anything but certain.

With the collapse of communism in most areas of the world, it is tempting to think that the U.S. can finally relax some of its omnipresent national security vigilance. However, events such as the Iraqi invasion of Kuwait remind us that this vigilance will continue to be a fact of life for the U.S. for many years to come.(23) As will be explained in the following section, the significance of this point is even more relevant considering the proliferation of arms in the new world.

The Proliferation of Weapons in the Post-Cold War Era

The general trend of weapons system proliferation is on the upswing in the Third World countries. While the U.S. begins the process of downsizing weapons stockpiles and the Russians do likewise, we should not believe that we can cavalierly and totally eliminate our own nuclear deterrent. As long as there are nuclear weapons or other weapons of mass destruction anywhere in the world, it is important that we believe there is a need for credible strategic forces to protect ourselves and our allies from any blackmail, nuclear or otherwise.

In particular, the number of countries that possess or are developing weapons of mass destruction is increasing.(24) According to some counts, there could be as many as 13 countries that either possess or are working on nuclear weapons or nuclear related capability.(23) The number of nations that possess chemical weapons is also on the rise. Currently, there are about 23 countries with the poor mans' version of a nuclear weapon and 17 countries are working on biological weapons.(23)

By the end of this century, the number of nations that will possess a ballistic missile capability or a space launch system is projected to rise significantly. It is estimated that more than 20 nations will have a ballistic missile capability in the near-term and the number is projected to go even higher.(18) Also, there are at least 18 countries that possess basic launch systems. A small subset of nation-states are developing a capability to put a satellite in orbit.(25) Brazil was one of those countries, but with the recent launch of an environment satellite, using a Pegasus rocket launched from the wing-tip of a B-52, they have technically joined the ranks of

launch capable nations.(26)

Given the above facts and figures, it is important to at least clarify which countries are actively involved in the proliferation of weapons. To do this, the world can be divided into a hierarchy of three tiers of states possessing advanced military capabilities. The obvious top tier is occupied by the U.S. and the CIS.(25) The second tier is occupied by states such as China, Brazil, France, Great Britain, India, Israel and Japan. These states not only have advanced ballistic missile programs but other major weapons as well.(25) The third and final tier is made up of countries such as Iran, Iraq, Pakistan, and Libya which have limited indigenous capabilities, but potentially have the means available that affords them the opportunity to purchase ballistic missiles and the other portions of the necessary infrastructure from supplier states, like the CIS.(25)

This data on weapons systems proliferation is provided simply to illustrate two very important points. Specifically, that just because the threat from the former Soviet Union has all but disappeared, it does not mean that the world is a safe place! On the contrary, one could safely argue that it is an even more dangerous one due to the significant trend toward wholesale worldwide weapons proliferation.(27) In fact, most of the above efforts are being furthered either through the migration of CIS scientists, the acquisition of technology and or sale of weapons by unscrupulous and would be rogue empire builders.(28) The second point in this section is that, with the growing proliferation of arms, the Third World may soon possess the intent, the will and the means to do just about anything they want to do.

But, what does the proliferation of weapons systems have to do

with the value of space control? Using the same logic pattern as above, it would seem that there is definitely a need for a capability to protect the U.S. and our allies from potential blackmail posed to our space assets, by the Third World and perhaps even the CIS in the future.

CHAPTER V

PROLIFERATION OF SPACE SYSTEMS IN THE POST-COLD WAR ERA

Given the burgeoning space world, prudence demands that America proceed cautiously and develop plans to address future contingencies in this new world order.(29) Most assuredly the potential future adversaries will study the lessons of the Gulf War no less diligently than we will. These adversaries will seek to avoid Saddam Hussein's mistakes if they decide to challenge the U.S. in the future. Some potential adversaries may be deterred by the punishment Iraqi forces suffered. Others may wonder if the outcome would have been different if Iraq had acquired nuclear weapons first, or struck sooner at Saudi Arabia, or possessed a larger arsenal of more sophisticated ballistic missiles, or used their arsenal of chemical and biological weapons.(29) Still others might wonder what would have happened if Iraq had possessed a capability to put satellites in orbit or to even to put up a crude ASAT system, that would most certainly have placed some of our space based assets at risk or perhaps even succeeded in blinding them.

Future adversaries' examination of the Gulf War events may well turn into a heated competition of Haves and Have Nots in an attempt to acquire the latest state-of-the art space systems and anti-satellite weapons. The Have Nots may even attempt to acquire satellites or capabilities from a cash hungry country like the CIS eager to

proliferate space systems and technology. Or, the Have Nots may begin to develop their own internal technological weapons as necessary instruments of national policy and a means to maintain stability in their respective region.(25)

The U.S. and its allies no longer hold an exclusive monopoly on space technology. The proliferation of space technologies will pose an increasing problem for U.S. policymakers.(30) Additionally, the proliferation of many space technologies and their inherent dual-use capability will pose problems for U.S. strategic and tactical forces, and complicate U.S. planning in future military engagements.(30) In particular, France, Germany, Japan and other European countries are making a whole host of key systems and components. These components range from electro-optical sensors to wideband tape recorders that can be used in country or sold for export to the rest of the world.(30)

What is the impact of all this activity? The impact is that with the spread of satellite capabilities (e.g. relatively secure communications and rudimentary surveillance systems) it will now be much easier for regional powers to target our forces and those of our allies on the ground. Equally troublesome is the fact that any country could, develop or purchase a very simple capability to kill a satellite in order to exploit the benefits of the high ground. With an ASAT capability, a country could use its systems to cripple critical peacekeeping operations, such as those that we carried out with our allies in the Persian Gulf, and do so in a manner that would be most difficult to counter.

Commonly Accepted Conventional Wisdom About The Use Of Space Systems

Since the end of Desert Storm, the conventional wisdom about space and space systems has been severely challenged. This wisdom

used to hold that:

- Civil satellites and civilian space programs represented peaceful technology--they were not militarily significant.(30)

- The few satellites that were militarily significant were made by the U.S.; the few other nations that could field military satellites were our NATO allies and Japan.(30)

- Even if Third World countries want to use space for military purposes, we need not worry because it will cost them billions of dollars to make systems of their own, and access to others' systems will not help them achieve a military capability.(30)

- Total exploitation of space requires a significant command and control and space surveillance infrastructure. This made space a playground for only the rich countries and corporations.

Post-Desert Storm Enlightenment Concerning The Use Of Space Systems

Forget the conventional wisdom, because it is no longer applicable. As noted earlier, one of the key lessons learned from Desert Storm was that space systems are now very important to any future successful war effort.(20) The Third World dictators and the Russian army have learned the lessons of Desert Storm--that in the Space Age--military operations cannot be conducted without the support of satellites for reconnaissance, communications and a number of other purposes.(22) In fact, this new thinking could affect the U.S. in several ways.

First, the rapidly expanding levels of foreign development and use of space systems might be used to the detriment of U.S. forces in future conflicts. For example:

- Critical parameters and performance figures for the major subsystems and components frequently overlap or are identical in

civil and military space systems. Civil space systems have already demonstrated substantial military utility; imagery systems are moving toward higher resolution and faster data delivery, and communications satellites have a high degree of crossover.(30) If Saddam Hussein would have had a Landsat type system he might have been warned about preparations of the allied flanking movement.(30)

Secondly, an increasing number of foreign space users possess the means and perhaps the ends to target U.S. satellites in order to deny or degrade their utility to U.S. and allied forces. For example,

- Poorer nations could develop a simple ASAT capability and use it because they may have little to lose.

- Foreign government spending on space has already reached substantial levels; cooperative and cost sharing agreements have reduced individual countries' cost of access to space

- The cost of putting a satellite on orbit can be reduced by relying on relatively inexpensive launch vehicles like a Pegasus or a Conestoga;

- The cost of acquiring space sophistication continues to decline, especially if a country relies on another country to provide the expensive infrastructure to support a satellite

It is easy to see that space systems are becoming increasingly important factors in the world's geopolitical posturing. The advanced systems that the U.S. possesses will definitely play a major role in the future accomplishment of U.S. national security goals and objectives. The dependence on these systems is significant. But during a wartime scenario, the U.S. does not have the capability to deter and deny an adversaries' space based intelligence collection or communications capabilities. Therefore, in order to protect our

forces on the ground and give them the edge in battle so that they can win quickly and decisively, the U.S. needs a more robust space control capability that includes an ASAT system.(25)

CHAPTER VI

BUILDING A CASE FOR SPACE CONTROL

In the 1991 NSS it was stated that, "Space will become in the future what oceans have always been - highways to discovery and commerce. But as with sea lanes, space lanes can be closed and can even be used as spring boards for attack."(11) The authors of the NSS went on to state that, "We must ensure the freedom of access to space and its use for exploration and development, for ourselves and all nations. Assured access and freedom of movement in space requires a healthy military space program. We must be able to monitor events in space, warn of threats and intervene to protect important assets."(11) "We must also have the option of active defense systems, including an anti-satellite system, to stop an aggressor before he can use a space system to threaten objects or people in or from space."(11)

The Value Of Space Control

Given these principles, the control of space is mandatory to ensure the success of any military operations whether it be in peace or war. The importance of space assets was noted by General Colin Powell to the House Appropriations Committee (HAC) when he stated, "We couldn't have done Desert Shield and Desert Storm unless we had total control of space."(31) General Merrill McPeak, Chief of Staff of the Air Force, asserted that our mission must be to reach into the air and into space, to control this dimension, to exploit it, to use it to keep Americans alive and free.(32) These comments have been echoed by General Bernard Schriever, USAF (Ret.) when he stated that "if you

don't control space you don't win the war." (33) Because, if we control air and space ourselves, we can move through it at will and we can decide who else shall move through it. Whoever does this, whoever controls Air and Space, accrues enormous military advantages. (14) But currently, the U.S. ability to control space and our ability to prevent hostile use of space is virtually nonexistent. We now exploit space, but do not possess the means to establish space superiority in war. This is a critical mission deficiency. (14)

This deficiency is indeed problematic because the U.S. today places great reliance on space based assets like communications, surveillance, navigation and a myriad of other functions that support peacetime and wartime applications and events on earth. "The Gulf War demonstrated once and for all that space systems are indispensable tools of modern combat. Their contribution to all such endeavors were central to the success of U.S. led coalition forces in outwitting and outgaming the enemy." (34) While the possession of satellites or ASATS may not have altered the ultimate outcome of the war, the lack of a satellite capability could have forced General Schwarzkopf, USSCENTCOM Commander, to launch a direct assault into the teeth of the Iraqi defense as opposed to the extremely successful left hook that took the world by surprise. (35)

The success of U.S. space systems during the war has placed new impetus and importance on the possession of space systems and space systems technologies. "As these technologies spread it is increasingly likely that in coming years America will find itself facing a military adversary in space. Like nuclear weapons or other weapons of mass destruction, space systems can be a powerful equalizer in the hands of a relatively inferior military force or for that

matter, terrorist element.(35) As space weapons technology proliferates, the U.S. should be planning and orchestrating its defenses. America's advantage in military space systems is indeed a vital component of its overall military strength that must be preserved.(35)

Given these arguments, it is bizarre and paradoxical that the U.S. is prepared to spend hundreds of billions of increasingly scarce funds to procure and upgrade weapons systems for ground, sea, and air warfare. Systems that inherently place warfighter lives at risk during combat. Yet, the U.S. balks at the relatively paltry cost of an ASAT program, compared to other major space systems, that could be quite literally critical to controlling space and ensuring the survivability and general combat effectiveness of these state-of-the-art systems.(36) Simply put, ASATs and other space systems are inherently impersonal, and their use does not unnecessarily place in harms way any U.S. warfighter's life, but are highly effective and efficient in accomplishing the mission. General Piotrowski (USAF, Ret), former Commander-In-Chief (CINC) United States Space Command (USSPACECOM), estimated that in 1988, "the U.S. had approximately \$400 billion in space infrastructure potentially at risk to Soviet endeavors to secure and exercise space control, but U.S. ability to contest such control remains wanted yet missing."(36) One could safely assume that the value of the infrastructure is much higher today and we are just as incapable of exercising total space control.

Importance Of Space Systems To The Warfighter

Space has lost its high-flown, research and development aura and has now taken on a more realistic and practical operational look. War

fighting commanders are now sold on the value of space systems. From Panama to the Persian Gulf, these systems have shown their capability in support of combat forces under fire.(37) Lt General Thomas S. Moorman Jr., Vice Commander of Air Force Space Command, declared "We're going to be all the more dependent on space systems for global support in the 1990's. They will become increasingly important as force-multipliers."(37)

The role space has and will play in the warfighting environment is very important.(38) During Desert Storm, our military space systems and their crews demonstrated to the whole world that space is fundamental to modern war and to national security.(34) The control of space is mandatory for future success on the battlefield. Without these systems, allied casualties could very well have been much higher.(35) These systems, through the use of overhead imagery and space based surveillance systems, can and do provide very important data to the national decision makers and battlefield commanders in a timely manner. Space is very important to the warfighter because it is an Area of Responsibility (AOR) that is adjacent to all the warfighting CINC's area of responsibility.(38) General Donald Kutyna (USAF, Ret), former CINC USSPACECOM said that "Space is an enduring reality, which, like mobility forces, provides support across the complete spectrum of conflict for all warfighting CINC's. Effective space is a fundamental element of superpower status. It is important enough and unique enough to stand alone as a critical element of our nations' military posture."(39)

It is also important to point out, as does the new NSS, that "Space forces are not entirely strategic. Rather, they also provide current and future contributions which distinctly support the tactical

warfighter. Today, approximately 70% of our military space effort is tactical in nature, and the vast majority of support we provide is to our conventional forces."(39) "Looking to the future, the ability of the United States to use any of its force packages depends heavily on its ability to operate in the high ground of space."(39)

"Many people speak of air power projection and the speed with which air power responded to the events in Southwest Asia. Space power played an important power-projection role: at the instant that Iraq invaded Kuwait, space systems were the first forces on the scene."(20) According to Martin J. Faga, former Assistant Secretary of the Air Force For Space Policy, "Desert Storm was the first large-scale opportunity for the forces in the field to understand that space systems are vital to their success."(34) "Desert Storm was an eye opener for the combat arms of all the services on the importance of space systems as a force multiplier. One thing that stood out was that we had space systems," declared Mr. Faga. "We had information, and Saddam Hussein did not. We could see, hear, and talk all through the war. After a few hours he could not."(34)

Air Force leaders are warning that because space systems gave the United States such huge advantages in the Gulf War that it is only a matter of time before potential adversaries develop systems to knock them out.(25) The strategist must consider what could have happened if Iraq had possessed satellite surveillance systems capable of monitoring allied troop movements. Or, if they had possessed ASAT type weapons that could have knocked our satellites out or at least temporarily blinded them.

The importance of a strong military space program to U.S. national security was clearly demonstrated during the Persian Gulf

Crisis. It was a prime example "of the way technology went to work making our troops more effective and ... safer."(2) Control of space was essential to our ability to prosecute the war quickly, successfully, and with minimum loss of American personnel.(2) Several examples are provided:

- Satellites provided multispectral images of the Persian Gulf region were extremely valuable in the preparation of tactical maps for combat operations.(2)

- Weather satellites were critical to the success of allied air operations and saved American and coalition forces lives.(2)

- Surveillance satellites helped identify enemy targets and validated the success of allied strikes.(2)

- The Defense Support Program, our early warning satellite system, allowed rapid identification of Iraqi Scud missile launches and quick alerts to our troops. This warning enabled the Patriot missile batteries to at least target and attempt to destroy the incoming missiles. The warning data also enabled the fighter aircraft to at least get a jump on destroying the very elusive mobile launch pads.(2)

- The Global Positioning System (GPS) satellites and hand-held receivers were used for the first time in combat and was invaluable in guiding coalition forces movements across trackless desert sands.(2)

- Communications satellites were the single most important factor that enabled the U.S. to build the command, control and communications network for the war.(20)

In the words of the former Secretary of the Air Force, Donald B. Rice, "Collectively these capabilities add up to global knowledge and situation awareness."(20) These comments by Dr. Rice have been echoed

by General Carl Stiner, Joint Task Force Commander during Operation Just Cause in Panama, "Space doesn't just help...I cannot go to war without space systems."(20) General McPeak described Desert Storm as, "the first space war."(20) "This war was a watershed event in military space applications because for the first time, space systems were both integral to the conduct of terrestrial conflict and crucial to the out-come of the war."(20)

It should be clearly obvious at this juncture, that the use of space and space assets can pay major dividends designed to benefit the warfighter. The utility of space systems has not been lost on our friends and adversaries. In fact, the Gulf War has rekindled European, Chinese and Japanese interest in developing military satellites not only for their own use but for export purposes as well.(40)

All this excitement about the value of space systems makes one wonder about the threat to these systems. The following section addresses the threats that could wipe out the systems our armed forces are becoming more reliant upon.

CHAPTER VII

THE POTENTIAL ASAT THREAT TO U.S. SPACE SYSTEMS

As noted, satellites are and will become more important to the regional powers as a means of supporting and enhancing military operations. The proliferation of remote sensing systems with military applications in the Third World and the commercial availability of militarily significant satellite imagery may be particularly significant. As the U.S. forces finally realized the benefits of satellite data in Desert Storm, our potential adversaries will also become heavily dependent on order of battle and targeting data. This

critical data is being made increasingly available by overhead satellites owned by various developing space powers.(41) This proliferation of satellite data, to potential adversaries could endanger U.S. forces and prevent them from effectively executing U.S. foreign policy or military operations.(7) For example, just as we would not tolerate enemy reconnaissance aircraft flying over our forces, we must not allow any enemy satellites to provide militarily useful data from space in wartime.(2) However currently, the U.S. lacks the capability to deny the enemy data collected from overhead sensors (military and third-party commercial) in our "Battlefield preparation" and "engagement" phases of a war.(41) Therefore, in the next war, it will be critically important to prevent an enemy from observing our movements and targeting our forces from space, and having an anti-satellite capability is the only way to do that.(20) This capability in future conflicts will be an imperative if we want our forces to have just as good a chance of survival as they do today. A failure to provide just such a capability to counter space collected data, threatens the very existence of the ground forces.(39)

Since the 1970's, the CIS has had the ability to degrade, disrupt and destroy U.S. satellites. They have four, and potentially five, distinct ASAT technologies which could be further developed to threaten all of the U.S. satellites from low-earth to potentially geosynchronous orbits.(39) "Their Co-orbital ASAT system, based at Tyuratam, is operational and is still maintained in a state of readiness."(39) It has been tested at least 20 times between 1968 and 1982."(42) "This system is launched into space in an orbit below and behind a satellite. It then pursues and destroys its target with a blast of shrapnel.(42) The CIS "also acknowledges that their GALOSH

anti-ballistic missile system has an inherent ASAT capability, and it is evidenced by their own statements that they have the doctrine to use it against U.S. satellites if they so choose."(39)(25) Their high energy laser and electronic warfare technologies may provide a means of degrading high altitude satellites."(39) The Russians have recently rolled out a fifth system. This latest system is patterned after the U.S. F-15 Air Launched ASAT (ALASAT) system developed in the mid-1980's. Specifically, the Russians have altered a MIG-31 to carry an ASAT on its centerline underfuselage."(43)

While ASATS require some highly sophisticated technologies, the deployment of a rudimentary ASAT by any state or organization within the next twenty years is not out of the realm of possibility. These states not only enjoy advanced technological capabilities, but they have access to sophisticated computer and tracking technology from the United States and Europe as well.(25)

If a country can develop its own indigenous satellite launch capability and their own stockpile of nuclear and other weapons of mass destruction as well as ballistic missile launchers, they can figure out how to develop and deploy an ASAT system. These points are important in talking about how to maintain space control in an environment where multiple players have very simple means at their disposal to create havoc with these space systems and frankly, it does not take much. For example, the simplest form of ASAT would involve the use of a direct-ascent type booster to scatter debris in the path of a target satellite. The debris could be as small as nails or ball bearings placed in the path of a target satellite. This would certainly give a regional country, large or small, a covert or overt kill capability inexpensively against a multi-million dollar

sophisticated satellite system. The Brazilian SLV, any of the Indian space launch vehicles , the Israeli Jericho II or Shavit, the Iraqi Al-'Abid, and even the Saudi DF-3 have the thrust necessary to reach low-earth orbit if employed in a direct ascent mode.(25) The technology is certainly within the capability of the newest spacefaring nations.(44)

The bottom line is that Russia and others in the future could literally blind, through the use of directed energy weapons or cripple, through the use of kinetic energy weapons or space mine weapons, the U.S. satellites, without fear of reprisal against their satellites. A position that leaves the U.S. impotent simply because Congress has failed to properly respond to the recognized dangers of space systems proliferation.(45) Besides approving the necessary funds for the development of an ASAT to act as a deterrent to these potential aggressors, what else can be done in the meantime?

CHAPTER VIII

ADVOCACY FOR AN ACTIVE U.S. DEFENSE SYSTEM

To counter the above threats, the U.S. more than ever needs a comprehensive space control capability. As noted earlier, a significant portion of the space control capability exists today. The portion that exists is the robust ground based space surveillance system that can detect and track hostile objects in space. But what is required to attain a complete space control capability are more satellites that are impervious to interference from hostile forces, and a comprehensive anti-satellite capability to deny the military use of space to future enemies.(2) The lack of an active operational

anti-satellite system to stop an aggressor before he can use a space system to threaten objects or people in or from space, potentially inhibits U.S. assured use of space and degrades the value of space control to a hollow concept.(11)

Can a U.S. anti-satellite ensure the right of safe passage in space for ourselves and our allies? According to Congressman Les AuCoin, it cannot do so directly. While we do not have the capability to defend against an attack today, an anti-satellite capability might conceivably deter such an attack.(46) An attack that could come from the former Soviet Union or any other nation.(45)

Today, the U.S. has the capability to develop an anti-satellite system. In fact, the U.S. has developed two ASATs since the 1960s. The first was a direct ascent, nuclear armed rocket interceptor that was operational on Johnson Island in the Pacific. It was deactivated in 1975 during the Arms Control euphoria following the signing of the SALT and ABM agreements in 1972. Despite this unilateral U.S. action, Moscow continued testing its Co-orbital ASAT and brought it to operational status in 1978.(42)

The second ASAT on which the U.S. initiated development on, was an Air-Launched ASAT. This concept consisted of a mini-missile that would be carried to the upper reaches of the atmosphere by an F-15 fighter jet, where it would be launched against hostile reconnaissance satellites in low earth orbit.(42) But the development of the F-15 ASAT was slowed by a series of Congressional moves that prohibited it from being tested. In 1988, this F-15 program was cancelled after 11 years of development and an expenditure of \$1.6 billion.(42)

By some accounts and a stretch of the imagination, the U.S. has another ASAT system. The Russians believe that the U.S. could seize a

spy satellite from orbit, using the U.S. space shuttle.(47) This belief stems from the fact that U.S. astronauts have recovered several U.S. satellites from orbit with the space shuttle, and another recovery is planned in 1993.(48) According to the author of "America's Secret Eyes in Space," the notion is "definitely not a kooky idea at all".(47) However, plucking a spy satellite from orbit is another issue and "would create a hole in that nation's intelligence-gathering system."(47) According to one official, "You would be seen doing it. It would be viewed as an act of war."(47)

Ten Anti-satellite Alternatives To A KE Or DE Anti-Satellite Weapon System

If Congress does not fund an ASAT system to assure U.S. access to space and to deny the enemy's use of space, how are we going to ensure that the warfighters on the ground have the support they need when they need it to prosecute the war and win it? According to the recently released National Security Space Policy, survivability and endurance of national security space systems, including all necessary system elements, will be pursued commensurate with the planned use in crisis and conflict, with the threat, and with the availability of other assets to perform the mission.(2) In compliance with this guidance, several alternatives are suggested here for protecting U.S. and allied space assets.

First, the U.S. could use passive measures to enhance the survivability of critical systems on board satellites.(11) These passive measures might involve tasking U.S. satellite developers to add more defensive capabilities such as additional on-board fuel for satellite maneuvers so on warning it can get out of harms way, additional hardening of key components, and additional redundant

systems to protect vital satellite functions.(25)

A second alternative, would be to attack enemy satellite communication links in order to deny an opponent access to data collected by space platforms.(25) The practicality of a very precise operation like this might be very complicated especially as developing Third World countries proliferate "portable" ground systems.(25)

A third alternative might involve placing all U.S. satellites in a geosynchronous or deep space type orbit. In this orbit, the satellite moves at the same relative speed as a point on the equator of the earth. "Satellites at this altitude appear unique in that they appear to be stationary to an observer on earth."(49) These orbits offer advantages for increasing satellite survivability because it places a satellite at an "altitude of 35,000 Km."(49) Currently, this type of orbit presents an attractive option because no country has successfully developed an ASAT system to reach the geosynchronous belt. Several concepts undoubtedly exist for reaching this altitude. One can only assume that it is simply a matter of time before an ASAT weapon, capable of effectively and efficiently reaching satellites at geosynchronous altitude, is developed. A country that has the capability to place satellites in this orbit today would certainly be capable of putting even the most unsophisticated ASAT at that altitude as well. While placing all satellites in a geosynchronous orbit is feasible, there are several drawbacks. Geosynchronous satellites are positioned over one place and stare at one area 24 hours a day. While not necessarily bad from an operational perspective, this type of coverage tends to limit flexibility in terms of viewing multiple areas of the world. The alternative to a geosynchronous orbit would be to employ low altitude satellites.

These satellites orbit the earth and see a "narrow ribbon" of the earth's surface about as "wide as a large metropolitan area", and equal in area to less than one percent of the earth's surface at least once a day.(49) However, because these low orbiters fly so much closer to the earth's surface, about "150Km to 1500Km", they are much easier to target.(49)

A fourth alternative would require the U.S. to proliferate its own space systems in order to make satellites more survivable. The basis of this argument is that given enough satellites, (i.e.) a full complement of duplicative on-orbit spares, survivability could improve in the face of an ASAT attack. The obvious problem with this approach is one of cost. For example, a "sophisticated communications satellite can cost as much as \$500 million to procure and launch into orbit."(49) In a resource constrained defense environment where budget cuts may take \$60-70 billion dollars from DoD coffers in the near-term, this approach would be extremely expensive and consequently very difficult to sell. In the long run, it might be cheaper and easier to fund a simple ASAT system versus funding multiple multi-million dollar satellite systems.

A fifth alternative might involve the use of defensive countermeasures such as decoys, chaff or other electronic devices/techniques. These capabilities, modeled after countermeasure techniques used in the aircraft world, might also be applicable in defeating an ASAT.(5) "Satellites can be spoofed-interfered with electronically and made to shut down or change orbit."(50) These devices are relatively cheap, useful at all conflict levels, and unlikely to be prohibited by arms control agreements.(51) But including these capabilities on satellites, might create significant

and intolerable weight penalties that could dilute the mission effectiveness and robustness of the planned satellite mission.

A sixth alternative might involve hardening of satellites against nuclear effects to a modest degree in order to preclude cheap kills by nuclear armed ICBMs, SLBMs or ABMs.(51)

A seventh alternative might include denying an adversary the capability to put payloads in orbit by destroying their telemetry, tracking and command stations, data processing facilities, launch pads, vehicle assembly areas and storage facilities.(52) While this could be done, two points must be made concerning these actions. First, certain types of satellites can function for extended periods without ground segment support, making the orbital platforms the most decisive target.(52) Secondly, there are concerns about the escalatory risk of attacking satellite-related areas within an adversary's homeland that may lead to political constraints.(52)

An eighth alternative available would be the declaration of "keep-out zones." (51) The U.S. could declare and then defend protective zones around critical satellites. Defended zones could offer significant protection against current ASAT weapons.(51)

A ninth alternative available to the U.S. could focus on a concept called "rules of the road." (51) The U.S., the CIS and other spacefaring nations could "negotiate restrictions on potentially provocative activities in space, such as unexplained close approaches to foreign satellites or irradiation of foreign satellites with low power directed-energy beams. With restrictions like these in force, any conduct of activities like the above would justify defensive or retaliatory measures." (51)

A tenth alternative could call for more inclusive arms control

measures. The U.S., the CIS and other spacefaring nations could negotiate limitations on the testing, deployment, or hostile use of anti-satellite systems.(51) This would be very similar to the present day nuclear non-proliferation treaty.

Unfortunately, the above alternatives are just alternatives. There are no guarantees that they could be employed to defeat an ASAT or even an inexpensive space mine designed to threaten the survivability of our satellites. The question remains, can we achieve space control?

CHAPTER IX

CAN WE ACHIEVE SPACE CONTROL ?

The Policy Perspective

Military space advocates have had a most challenging time trying to convince lawmakers of the need to develop weapons designed to protect U.S. satellites. ASAT advocates have argued that international law permits the use of space for individual and collective self-defense and any conceivable activity not specifically prohibited or otherwise constrained.(53) Clearly, the Soviets have taken full advantage of this interpretation in the development and experiments/testing of their ASAT systems. While Soviet experiments with anti-satellite devices helped make funds available for U.S. efforts, lawmakers have over time, grown increasingly hesitant at financing any significant and sizeable effort.(32)

The attempts to provide additional funding, and the consequential on-going debate between the legislative and executive branches resulted in the development of the National Space Policy Directive 1, 2 November 1989. A follow-on result of this process, and a very significant move in terms of policy direction, came from the National

Space Council in January 1993. In their final report to the President, one of the report objectives pertinent here was the one designed, "to ensure the freedom of space for exploration, development, and security."⁽²⁾ For clarity, selected portions of the policy language of these directives is provided:

The National Space Policy Directive 1, dated 2 November 1989, contains six overall goals. One of those goals is to, "strengthen the security of the United States...and that United States space activities shall be conducted in accordance with the following principles:...The United States will pursue activities in space in support of its inherent right of self-defense and its defense commitments to its allies; the United States considers the space systems of any nation to be national property with the right of passage through and operations in space without interference. Purposeful interference with space systems shall be viewed as an infringement on sovereign rights."⁽²⁾

The National Security Space Policy also states that, "the United States will conduct those activities in space that are necessary to national defense. Space activities will contribute to national security objectives by: one, deterring, or if necessary, defending against enemy attack; two, assuring that forces of hostile nations cannot prevent our own use of space; three, negating, if necessary, hostile space systems; and enhancing operations of United States and allied forces."⁽²⁾

The National Security Space Sector Guidelines, that support the Space Policy, is also very specific in its definition of what is required for Space Control. The guidance is as follows:

- The DoD will develop, operate, and maintain enduring space

systems to ensure its freedom of action in space. This requires an integrated combination of antisatellite, survivability, and surveillance capabilities.(2)

- Anti-satellite Capability. The United States will develop and deploy a comprehensive capability with programs as required and with initial operational capability at the earliest possible date.(2)

- The United States will develop and maintain an integrated attack warning, notification, verification, and contingency reaction capability which can effectively detect and react to threats to United States space systems.(2)

Given these guidelines, can the U.S. achieve a space control capability?

First, as mentioned earlier, the U.S. currently possesses a worldwide network of space surveillance and missile warning sensors. These sensors are in place to detect, track, identify and catalog all man-made objects in space; and to detect and react to threats to U.S. space systems. As a result, they fulfill two of the Space Control tenets contained within the National Security Space Sector Guidelines of the National Space Policy.(2) Specifically, these tenets are designed to not only ensure freedom of action in space, but they must be integrated with anti-satellite and other survivability measures designed to protect U.S space systems .(2)

Secondly, there exists an incongruency in attempting to tie the National Space Policy and the NSS together. The NSS, does not address the subject of developing ASATs or for that matter assuring access to space and denying access to our enemies. Whereas the previous NSS guidance was very clear on the subject of ASATs. Resolution of this language will bring the U.S. another step closer to achieving an

effective and complete space control capability.

Rather than extending the U.S. arms race into space and undercutting the 1972 Anti-Ballistic Missile treaty, critics have argued forcefully that the U.S. would gain more by negotiating an outright ban on ASAT weapons.(36) The main thrust of their argument is that the avoidance of an "ASAT race" with the former Soviet Union, would preserve a "space sanctuary.(2) This represents a third way to potentially achieve a space control capability. Critics have argued that a worldwide ban on ASAT weapons would preserve the American lead in military space systems without having to spend billions to protect our satellites and eliminate wasted effort in trying to devise a way to destroy the enemy's.(36)

However, space systems proliferation has forever and profoundly changed the space control equation. It is now time to re-think the "space sanctuary" concept.(2) Sixteen nations today have some capability to use space to support their military operations. This capability has either been developed indigenously or has been purchased from another country or industry. That number is expected to double by the beginning of the next century.(2) The National Space Council believes that the U.S. should continue its aggressive efforts to curb the proliferation of these technologies through security and export controls. Unfortunately, the U.S. will probably be unsuccessful in curbing the incentives for the Third World Have Not countries to develop some sort of a space capability, especially if their Have Not neighbors are developing their own space capability. As a result, the U.S. should plan for the future and not gamble that space capabilities will not be used against us in future regional conflicts.(2)

But, the U.S. does not have to wait for a regional conflict to experience what others can do to our own space systems. It is already known that, some U.S. systems are vulnerable to intentional jamming from the ground.(25) There is evidence that rogue nation-states have already interfered with U.S. space assets this way. Specifically, "U.S. communications satellites have been subject to radio interference from ground stations operating on the same frequency."(25)

In order to achieve a space control capability and deter others from tampering with our satellites, we must draw upon lessons from our past to get the point across to Congress that there is merit in fielding an ASAT capability. In the 1950's the U.S. relied upon the existence of our growing nuclear weapons capability to deter conflict and attacks upon the United States. In applying the same logic, it is opined that an ASAT system would deter potential attacks against our vital and precious satellite resources in much the same way. Clearly, we need to develop and maintain an effective capability to deny the use of space to our adversaries during conflict or war.(2)

Previous arguments for continuing even a meager program for ASAT weapons were to serve as a hedge against the former Soviet Union. These activities were all permitted by space-related treaty language and the United Nations charter. Specifically, these documents permit all activities necessary for self-defense or national security.(44) Congress would argue that there is no problem here because the former Soviet Union program has not been tested since 1982.(46) As a result of this and because the U.S. is now working on a more cooperative basis with the CIS, Congress has said that it is no longer necessary to continue with U.S. kinetic energy and directed energy ASAT

programs.(13) To be fair, one must consider the position of the critics that, the development of space weapons might derail the ABM treaty and perhaps provoke a new kind of arms race. But, if the laws are so strictly construed and interpreted, we would not even be allowed to launch the space shuttle. (The former Soviet Union had long claimed it was an anti-satellite capability.)(44) For that matter, we might not even be allowed to launch any satellite since it could theoretically, run into another space object and therefore, be considered a potential anti-satellite device.(44) There is just too much at stake not to review the bidding and start over with a clean slate. In the meantime, only a portion of the Space Control mission can be achieved today, and certainly not to the integrated and survivable extent envisioned by the authors of the National Space Policy.

The Budget Perspective

Can we achieve space control from the budget perspective? The expansion of the space mission and reliance on space by DoD has resulted in significant and corresponding growth in the size of the Air Force budget over the past several years. For example, space related funding claimed 2% of the total AF budget in the 1960's to 6-7% in the 1980's. More specifically, the Air Force was spending about 75-80% of the DoD space budget equating to about a \$6 billion space budget.(20) "We have seen traditional forces cut...we have not seen that to the same degree in the space field."(54) Recent data indicated that while the United States scales back its defense spending over the next few years, steady growth in the military space budget is expected.(55) The DoD budget for 1993 was estimated at \$272 billion with a projected space budget of around \$16 billion in 1993.

By 1997 the space budget was projected to be almost \$18 billion.(55) Nevertheless, the clamor to reduce the DoD budget by \$60-70 billion has not left the Air Force immune to their fair share of budget cuts. Recently, active steps were taken to restructure the entire Air Force budget. In fact, General Powell praised the Air Force leadership in their restructuring of the Air Force Budget. He stated, that "they have put a priority on the leverage we get from advanced technology and have moved to capture the high ground of space for America's strategic and tactical advantage."(56)

As shown by the above numbers, there is increased impetus for spending on space systems due to the increasingly important contributions of these systems. But, if these systems are important, then should not funding be authorized for an ASAT system to serve as a deterrent to others launching an attack against these systems? Clearly the weight of the policy argument is on the side of the ASAT advocates. Nevertheless, even if that argument is ever successfully won, how much of this burden should the U.S. bear? How much of the cost burden should its allies bear if they derive benefit from U.S. space systems? The next section offers some alternative insights into this funding/budget issue.

The Alternatives To A U.S. Only Anti-Satellite Capability

As shown earlier, several factors have had a profound impact on U.S. space activities including the dramatically changed geopolitical environment, the heightened sensitivity to issues affecting U.S. economic and technological competitiveness, and increasing concerns about the worldwide proliferation of space technologies, systems, and capabilities.(57) The Cold War kept the defense coffers full around the world. Now, it seems that no country can really afford to explore

the High Ground on its own or invest heavily in space technologies and systems.(58) While several corporations and countries are giving the U.S. stiff competition in the area of leading edge technologies, clearly that level of spending will be hard to maintain. But it is posited that, it does not really cost alot to get an anti-satellite capability. From all indications, the development of an inexpensive anti-satellite, a Kinetic energy anti-satellite or even the corresponding launch capability would not be all that stressing financially. However, if the U.S. cannot afford to develop its own anti-satellite system or lacks the single mindedness to pursue this activity, perhaps the answer lies in constructing a cooperative effort similar to what was established for Operation Desert Storm and the Somalian relief effort.

In a report entitled A Post Cold War Assessment of U.S. Space Policy , the task group responsible for this report recommended that, "The United States should take the initiative in shaping a common international agenda in selected areas of civilian and national security space activities. One goal is to find ways to use the space capabilities of the world for common objectives."(57) Cooperative efforts are not unheard of and already have some precedence in the space world. Just a few of the growing plethora of cooperative efforts are highlighted here. For example, the CIS will put an astronaut aboard a U.S. shuttle flight in 1993.(48) Also, a proposal has been made for the U.S. to share with the CIS sensitive intelligence data, and another where Lockheed and Russia's Khrunichev Agency form a commercial satellite launch venture.(59) Additionally, the U.S. and France have agreed to explore cooperation in the military uses of space. Areas to be explored include communications,

navigation, environmental monitoring, space technology experiments, personnel exchanges, and a limit on the proliferation of missile and space technologies.(60) A final effort, that would begin to open the door for future cooperative ASAT type defensive initiatives, is one that was agreed to by then President Bush and President Yeltsin in June of 1992. Basically, it was agreed that the U.S. and Russia would work together, with allies and other interested states, in developing a concept for a Global Protection System (GPS) against ballistic missile attack.(10) In this regard, Georgi Mamedov, Russia's deputy foreign minister, stated that this GPS should include more than two superpowers. The GPS must "be joint in nature and multinational in character open to all interested countries that have embraced international standards aimed at stemming the flow of proliferation of weapons of mass destruction and the means for their delivery."(61)

Enhanced international cooperation should be sought not only for its programmatic benefits, but also because it is the preferred way for the United States to influence the direction of future space undertakings around the world.(57) As one might imagine, there are several advantages to this type of joint or cooperative effort particularly in the development of an ASAT. Some of the reasons are as follows:

- "The United States should take advantage of and employ the existing space assets and capabilities of the former Soviet Union on a selective basis when they offer unique programmatic benefits..."(57)

- Cooperation would save precious resources at a time when the world is drawing down their defense establishments and generally facing the prospect of slower economic growth. As in Operation Desert Storm, the coalition was paid for by countries receiving the benefit

of coalition efforts and the coalition members itself. The same philosophy of shared costs could work very well here based on the precedence setting funding arrangements established long ago by NATO and the U.N.

- Cooperation shortens the weapons systems development timeline by removing the international barriers to such an effort. Additionally in the same vein, a consortium or coalition could share in the design and streamline development of a new defensive ASAT system.

- Cooperation would foster use of existing assets. For example, the Soviet Co-orbital ASAT could be used as a foundation for all future developmental activities. As pointed out earlier in this paper, the existing operational system has a proven track record.(25)

- Broader national security, political, technological, and economic benefits for the United States can flow from a carefully crafted "cooperative strategy" that balances the realities of economic competition with the potential benefits of cooperation.(57)

- Expanded cooperation in military uses of space, could dampen the proliferation of independent space launch, warfighting, and support systems.(57) Prudence would seem to dictate that economy of scale initiatives are the order of the day. For example, Europe is working toward its own Space-Based Defense System. Its initial purpose is to monitor troop movements and verify that arms treaties are being respected.(62) It would seem only natural that the world's space owners and operators should collectively take advantage of these kinds of efforts.

The formation of a space control coalition potentially raises several disadvantages. They are as follows:

- Selected critical technologies might be divulged. However, this is probably not an insurmountable problem and could be dealt with given the alternatives of not building a defensive system at all.

- The U.S. and Allied reliance on CIS products and systems may not be in the best interest of the U.S. The quality of CIS products has been inconsistent. For example, some countries may not buy products and services from the Soviet Union for this reason even though their goods are less expensive. But in other areas like the TOPAZ nuclear reactor, their product is state-of-the-art and has been purchased by the U.S.

- Also, in pursuing cooperative efforts, the U.S. must be selectively willing to be dependent on foreign suppliers for essential components or systems.(57) This could create National Security concerns about reliance on foreign firms in building defensive systems.

- The idea of placing our security in the hands of "collective internationalism" could be a dangerous notion.(63) In trusting our satellite security to a nation that possesses the only ASAT weapon, would be like inviting the fox into the chicken coop and hoping everything will be alright. To overcome this problem, it is advocated that a strong international command, control and communications process would have to be established for it to work. This in itself may be the greatest single challenge to an effort of this magnitude.

CHAPTER X

SUMMARY AND CONCLUSION

This paper has looked at several areas in an attempt to answer the question about the value of space control and whether or not we can achieve it. In attempting to answer this question, this author noted early on that space control means more than just having an anti-satellite capability. However, the areas of surveillance, survivability, and launch were not discussed in any great detail because they exist and are typically well supported from many perspectives. The critical void in space control rests in the nonexistent negation or anti-satellite mission area and as a result, was the focus of this paper. Therefore, as a reminder, this paper accomplished the following by providing: a definition of space control; the latest national security strategy guidance; and the threat, that drives the space control environment. The paper built a case for space control which included looking at the value of space control and why space systems are important; it examined the potential threat to U.S. systems; it looked at some anti-satellite alternatives, and how we can achieve space control that focused on policy, budget and alternative courses of action to a U.S. only funded and developed ASAT system. The conclusion is, that space control is a valued concept and there are ways in which it can be achieved to assure the future role of the United States as a world leader, policeman and superpower.

The U.S. must have the capability to prevent an attack against our space systems. Much like the U.S. relied on the existence of nuclear weapons as a deterrent to prevent major war in the last forty five years, so must we have an ASAT capability to deter attack against

our valuable space systems. In short, we must have the capability to deny and deter any adversary from thinking that they can deny the use of space to the United States.

An ASAT capability is needed to assure that just as U.S. forces have achieved control of the air and the battlefield since WW II we can control space as well (i.e.) achieve something akin to air superiority called space superiority.(20) As General Kutyna noted, It is not enough just to provide satellites for our use; one must acquire and maintain control of the space environment. Unless we have a sound space control capability, we may find ourselves in a conflict with a spacefaring nation and have no means to prevent space-supported attacks on ourselves or our allies.(3) Just as it would be unthinkable in a future conflict to permit an adversary to use an aircraft to reconnoiter our battlelines for intelligence and targeting, so is it equally unacceptable to allow enemy reconnaissance satellites free and unhindered flight over U.S. military positions.(2) An operational ASAT capability designed to eliminate an adversary's space capability must be considered an integral part of this country's force structure in the future.(20) Congress must reconsider their action to cancel the modest ASAT program.(42)

"We need to develop anti-satellite capabilities to ensure that we can deny an adversary unimpeded use of his space systems against our forces."(64) Desert Storm clearly showed the world that space is the new high ground in any next war. Air Force leaders are warning that space systems gave the U.S. such huge advantages in Operation Desert Shield/Desert Storm that it is only a matter of time before potential adversaries develop systems to try and knock them out. Future military leaders, they contend, will not let that high ground go

uncontested. So, if the U.S. hopes to retain its ability to support allies globally and enforce international stability as it has throughout the post-Cold War era, it must obtain the capabilities that will allow it to maintain its advantages.(25)

Finally, one could argue that our old nemesis, no longer exists. However, the strategist must be prudent and not forget that Russia and the CIS still possess many military capabilities to include an operational Kinetic Energy Weapon system. Additionally, the reader will recall that the space threat is not necessarily just from the CIS any longer. The critic must be reminded that this is not an attempt to create a threat du jour just to suit our need for a weapon system. Space system technology and capabilities are proliferating around the Third World.(54) These capabilities are real and expanding, and could be a significant force we may have to face sooner than anticipated. What Paul Wolfowitz said about our ability to predict the future threat is equally applicable when discussing the space threat. He stated that, "Before we attempt too much precision in such calculations, we need to keep in mind that our ability to predict future threats is limited, and the lives of American service men and women will depend on whether we have enough."(21) He went on to say, "Five years ago, anyone would have scoffed at a description of the events as we have all seen unfold in recent years. Ten years ago, people scoffed at the idea that Iraq could be a threat to other Arab countries-but the basic planning for the forces we deployed to the Persian Gulf was begun 10 years ago."(21) In applying this same logic to whether or not the U.S. should develop and deploy an ASAT capability, it seems clear that the U.S. can ill-afford to not begin the active and prudent planning for a U.S. ASAT system.

But, to obtain a space control capability, the U.S. must do several things first:

- Develop cogent thinking about the next threat and the need for an ASAT capability. This thinking must include a revision of the National Security Strategy guidance that fails to specifically call for the development of an ASAT system that can protect these precious assets. The National Space Policy directives are a step in the right direction. But these directives need to be institutionalized in the NSS. Especially, if efforts are now in progress to relay imagery from spy satellites to the cockpits of U.S. military planes, so that pilots can get up-to-the-minute information on the unfolding battlefield situation toward which they are heading; and allowing military commanders to get direct readouts from U.S. missile-tracking spacecraft overhead; then we need a way in which to protect these assets.⁽³⁾ But if adversaries are allowed to threaten and take out these assets, these efforts will be meaningless. The time in which adversaries might be able to threaten geosynchronous satellites cannot be too far away. In fact it may be closer than we think as the Russians begin marketing their space launch boosters and continue work on the development of a nuclear-powered rocket.⁽⁶⁵⁾ The point is, that we must not be lulled into a false sense of security that says that an adversary will never be able to put our geosynchronous assets at risk.

- The U.S. has stated policy recommendations to strengthen its efforts at international control and cooperation of space technology and satellite system development. Congress must see the wisdom of this cooperation and clear the way with enabling legislation designed to permit cooperative development of an ASAT capability. History is

replete with examples about how having a capability was sufficient to prevent a potential adversary from taking an action that was deleterious to our National Interests.

- The nations which successfully exploit space and the planets now accessible will largely influence events on Earth, both in the near future and in the next century. The United States must be that nation, or be part of a group of nations allied to act for the collective benefit of the free world. Most importantly, the United States cannot and must not allow any potential adversary to deny us access to space.(66)

Finally, the U.S. must maintain the ability to control space. The U.S. must continue to mix offensive and defensive measures to ensure freedom of action on-orbit for friendly forces and to prevent enemies from using space for purposes inimical to U.S. interests.(52) As General Schriever (USAF, Ret), stated "without control of space, you don't win the next war."(33) We fought the "first Space War" and the U.S. relied heavily on our space assets. We cannot afford to ignore space control, especially since we do not possess an ASAT like the Russians. Our ability to achieve the same swift victory in future wars without this assured capability places our forces at risk. Perhaps, General McPeak said it best as he stated that, "Our ability to prevent hostile use of space is virtually nonexistent....we must be able to deter hostile use of space, to extend our control beyond the atmosphere. We now exploit space, but do not possess the means to establish space superiority in war. This is a critical mission deficiency."(14)

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GLOSSARY

ABM	- Anti-ballistic missile
ALASAT	- Air Launched Anti-satellite
AOR	- Area of Responsibility
ASAT	- Anti-satellite
CINC	- Commander in Chief
CIS	- Commonwealth of Independent States
DE	- Directed Energy Weapon
DoD	- Department of Defense
DSP	- Defense Support System
GPS	- Global Positioning System
GPS/GPALS	- Global Protection System in the Global Protection Against Limited Strike System
ICBM	- Intercontinental Ballistic Missile
KE	- Kinetic Energy Weapon
NATO	- North Atlantic Treaty Organization
NMSD	- National Military Strategy Document
NSS	- National Security Strategy
SLBM	- Sea Launched Ballistic Missile
USSPACECOM	- United States Space Command